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for mapping. On the whole, 18 types of plant communities are recognized, briefly characterized, and plotted. An inspection shows, as its author points out, that the areas have in general a north and south rather than an east and west trend, which tends to show that the major differences in vegetation are here determined more largely by conditions of moisture than of temperature.

While the result is decidedly the best map of the sort yet produced, it is also probable that it would be difficult to find an ecologist who would agree with it in every particular. So much of the disagreement would be differences of opinion as to what should be included within a single vegetational type, that diverse criticism would be neither a gracious nor a practical task, and yet the reviewer cannot refrain from expressing a question as to the fitness of including both the *Pinus ponderosa* and *P. Murrayana* forests of the west and the *P. Strobus*, *Tsuga*, and *Abies balsamea* forests of the east in the "northern mesophytic evergreen forest."—GEO. D. FULLER.

History of forest ecology.—A recent study of the historical development of forest ecology is likely to prove of equal interest to foresters and ecologists. In it BOERKER[26] traces the development of plant ecology from its beginnings to the modern phase characterized chiefly by efforts to measure the various habitat factors. The beginnings of forest ecology are seen in the empirical development of silviculture, dating back to the fifteenth century or even earlier; but the founder of the science is considered to be DUHAMEL DU MONCEAU, about the middle of the eighteenth century. About a century later the work of HARTIG and that of a committee of 5 German foresters, appointed in 1868, consisting of WESSELY, HEYER, EBERMAYER, JUDEICH, and BAUR, gave the science further impetus, and resulted in the organization of a series of forest experiment stations throughout Germany. From this beginning the advancement of the science is traced to the present day, as shown in the work of WAGNER, MEYER, and DUESBERG in Germany, and that of FERNOW and ZON in America. It is notable that not until 1909 were forest experiment stations established in the United States.—GEO. D. FULLER.

Permeability.—It is well established that a great variety of stimuli (light, temperature, salts, anesthetics) modify the permeability of protoplasm. In some cases the stimulus decreases the permeability at low intensity and increases it at high intensity. KOKETSU[27] believes he has demonstrated that electrical stimulation increases the permeability of epithelial cells of *Tradescantia discolor*. Cells thus stimulated are less easily plasmolyzed by ordinary plasmolytic agents than are unstimulated cells. After recovery from the stimulus they show a greater degree to plasmolysis by the same concentration of the agent than do the checks. He interprets the first change as due to greater permeability of plasmolytic agents, and the second change as due to loss of solutes during the period of higher permeability. SZÜCS[28] finds that aluminum salts render cells more difficult to plasmolyze because they harden the protoplasm, although they really decrease its permeability. One must look out for a similar condition with electrical stimuli. The experiments are qualitative but suggest the need of very careful quantitative studies.—WM. CROCKER.

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[26] BOERKER, R. H., A historical study of forest ecology; its development in the fields of botany and foresty. Forestry Quarterly **14**:380–432. 1916.

[27] KOKETSU, R., Über den Einfluss der elektrischen Reizung auf die Permeabilität der Pflanzenzellern. Bot. Mag. Tokyo **30**:264–266. 1916.

Texas root rot fungus.—DUGGAR[29] has investigated the causal organism of one of the most destructive of the cotton diseases, an organism which seems to be confined largely to Texas, where the average losses have been variously estimated to be $2,000,000 to $3,000,000. In addition to the attacks on cotton, the fungus damages such crops as alfalfa, beans, sweet potatoes, and certain orchard fruits. As illustrating the omnivorous habit of the fungus, DUGGAR enumerates a list of nearly 30 host plants (trees, shrubs, and herbs) already noted as used by the fungus. The chief feature of the disease is the sudden wilting and dying of the affected individuals. The fungus was described by SHEAR as *Ozonium omnivorum*, but DUGGAR concludes that it should be transferred to *Phymatotrichum*. In the revised description of the species the habitat is stated as follows: "Hyphae on living roots of many plants and in the soil; conidial stage on soil in the vicinity of diseased plants."—J. M. C.

Embryo and seedling of Dioscorea.—Miss SMITH[30] has investigated the embryo and seedling of *Dioscorea villosa*, a genus long known through the work of SOLMS-LAUBACH as furnishing evidence of a "second cotyledon," or at least a seedling structure quite different from what had come to be regarded as the monocotyl type. Miss SMITH traced the development of the embryo to the spherical 4-celled proembryo, and then followed the appearance of the organs. She observed no cotyledonary ring, and claims that the single cotyledon originates as a terminal structure. It may be stated that the course of the vascular strands suggests that the leaf called the "first secondary leaf" occupies the position of a "second cotyledon," which would make the growing point of the stem a terminal structure, and both cotyledons lateral. This, however, is a matter of interpretation in connection with material.—J. M. C.

Vitality of moss protonema.—Miss BRISTOL[31] has discovered some remarkable cases of the retention of vitality by the protonema of mosses. In samples of soils obtained from various places for the purpose of ascertaining by means

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[28] Rev. in BOT. GAZ. **56**:245. 1913.

[29] DUGGAR, B. M., The Texas root rot fungus and its conidial stage. Ann. Mo. Bot. Gard. **3**:11–23. *figs. 6.* 1916.

[30] SMITH, PEARL M., The development of the embryo and seedling of *Dioscorea villosa*. Bull. Torr. Bot. Club **43**:545–558. *pls. 31–34.* 1916.

[31] BRISTOL, B. MURIEL, On the remarkable retention of vitality of moss protonema. New Phytol. **15**:137–143. *figs. 3.* 1916.